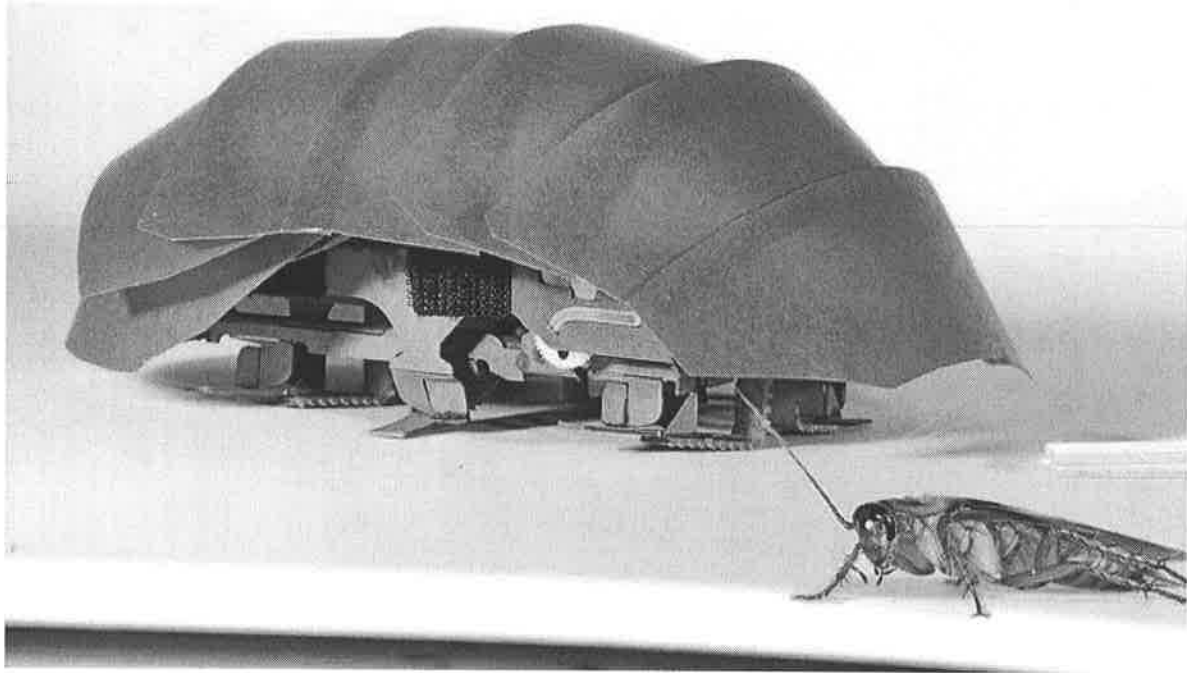


# What do you call a robotic cockroach? A tiny hero designed to rescue

By Associated Press, adapted by Newsela staff on 02.16.16

Word Count **617**



The compressible robot, also known as CRAM, was modeled after a real cockroach, which has impressive strength and speed. Photo: PolyPEDAL Lab UC Berkeley/Tom Libby, Kaushik Jayaram, Pauline Jennings via AP

WASHINGTON, D.C. — When buildings fall down in future disasters, a robotic cockroach may be the new hero. It could scurry through the rubble to help rescue people.

Cockroaches may be disgusting. However, they have the remarkable ability to squish their bodies down to one-quarter their normal size, yet still scamper at lightning speed. Also, they can withstand 900 times their body weight without being hurt. That's similar to a 200-pound man who would not be crushed by 90 tons on his head.

The amazing cockroach inspired scientists to create a robotic cockroach. The robot can mimic the cockroach's feats of strength and agility.

In the future, scientists hope the robots could carry cameras, microphones and other sensors. Then they could be used in earthquakes and other disasters to help search for victims by squeezing through small cracks. The skittering robots could also let rescuers know if the rubble pile is stable.

## **Overcoming The Creep Factor**

Cockroaches "seem to be able to go anywhere," said Robert Full, a science professor at University of California at Berkeley. He is co-author of a study about the model cockroach robot. "I think they're really disgusting and really revolting, but they always tell us something new."

The study was published Monday in the magazine Proceedings of the National Academy of Sciences.

The model, which is about as big as a human palm, is called the Compressible Robot with Articulated Mechanisms, or CRAM. It looks more like an armadillo and walks sort of like the actor Charlie Chaplin when it is squatting down and compressed. Chaplin walked in a jerky motion with his feet out the sides. CRAM is about 20 times the size of the cockroach that inspired it. CRAM is also simple and cheap.

## **A Little Cardboard, A Little Origami — And Voila!**

Co-author Kaushik Jayaram, a Harvard University robotics researcher, said the most difficult part was the design. To build the model, he used commonly found electronics and motors, cardboard, polyester and some knowledge of origami. He could probably put a model together in about half an hour, he estimated.

All told, the model probably cost less than \$100, Jayaram said. He figures that eventually the robots, with sensors and other equipment added on, could cost less than \$10 each.

In the past, scientists have tried to create robots to get into tight places. The scientists thought about soft animals like slugs or octopuses that can change their shapes, Full said. However, the cockroach has certain advantages, including speed and resistance to being crushed.

## **Fast. Strong. Disgusting.**

With nothing in its way, the American cockroach can travel 50 body lengths in a second. The speed would be similar to a human running more than 140 miles per hour, Full said. When compressed, the cockroach slows to 20 body lengths per second, which is still pretty fast.

Full and his teammates found cockroaches used a certain type of locomotion to ooze through cracks. The cockroaches' movement is based on the ideal amount of belly friction.

Cockroaches have inspired other robots. Some have been made that travel on six legs to get over rubble more easily, said scientist Noah Cowan. He said cockroaches and insects are great design guides to inspire robot scientists.

The robots can go into places where humans cannot. Cowan said they "can go into environments that are not safe for humans."

## **Just Not In The Kitchen**

Still, the robot designers have no love for the bug that inspired them.

"I'm still creeped out by them," Jayaram said. "I don't want them in my house. I don't want them in my kitchen. That hasn't changed." However, "we can learn a lot of interesting things from even the most disgusting animals."

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